



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

09/692,156

10/20/2000

Min-Cheol Hong

630-1165P

7914

7590

10/22/2003

Birch Stewart Kolasch & Birch LLP
P O Box 747
Falls Church, VA 22040-0747

EXAMINER

LE, BRIAN Q

ART UNIT

PAPER NUMBER

2623

DATE MAILED: 10/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/692,156

Applicant(s)

HONG ET AL.

Examiner

Brian Q Le

Art Unit

2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 8, 10 and 15 is/are rejected.
- 7) ☒ Claim(s) 4-7, 9, 11-14 and 16-18 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 October 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

Art Unit: 2623

Claim Objections

1. Claim 3 is objected to because of the following informalities: Claim 3 recites the limitation "the added function M(f)" on line 4 of claim 3. This limitation is not mentioned in claim 1 which claim 3 refers to. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 3 recites the limitation "the added function M(f)" on line 4 of claim 3. There is insufficient antecedent basis for this limitation in the claim. This limitation is not mentioned in claim 1 which claim 3 refers to.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 3, 8 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuen U.S. Patent No. 5,949,914.

Art Unit: 2623

Regarding claim 1, Yuen teaches a filtering control method for improving the image quality of a bilinear interpolated image in methods for getting a high resolution image from a low resolution image, comprising:

Restoring a requested high-resolution image f by using Point Spread Function (PSF) with the low-resolution image. Yuen does not clearly indicate the usage of bi-linear interpolation filter in his equation. Nevertheless, Yuen indicates that bilinear interpolation can be used to restore high-resolution image by interpolating the pixel value. Therefore, it would have been obvious for one skilled in the art to restore high-resolution image by using a bi-linear interpolation filter from an equation with PSF and the low-resolution image.

For claim 3, Yuen further teaches the filtering control for improving the image quality of the bi-linear interpolated image wherein the high resolution image f is restored by find a PSF whereas a high resolution image is computed by PSF and high resolution image found by the interpolation method (f^n , the latest and previous estimated restored image) (column 6, lines 1-55 and column 7, lines 1-24).

Regarding claim 8, Yuen futher teaches the filtering control method for improving the image quality of the bi-linear interpolated image with an up-sampling value of the image (column 6, lines 40-43).

Regarding claim 15, please refer back to claim 8 for the explanation.

6. Claims 2 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuen U.S. Patent No. 5,949,914 as applied to claim 1 above, and further in view of Pattie U.S. Patent No. 5,696,848.

Art Unit: 2623

Regarding claim 2, Yuen does not take noise component as a factor in the equation to generate high-resolution image. However, Patti discloses a method of restoring high resolution image (abstract) with the consideration of noise as a factor in the equation to generate high resolution image (column 15, lines 51-57). Modifying Yuen's method of restoring high-resolution image according to Yuen would be able to consider noise as a factor in the equation of generating high resolution image to enhance the smoothness and thus improves the quality of the image (column 15, lines 50-56). This would improve processing and therefore, it would have been obvious to one of the ordinary skill in the art to modify Yuen according to Pattie.

Regarding claim 10, please refer back to claims 1-3 for further explanation.

Allowable Subject Matter

7. Claims 4-7, 9, 11-14 and 16-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

CONCLUSION

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to further show the state of the art with respect to image quality enhancement, high resolution image restoration, bi-linear interpolation filter and point spread function (PSF):

U.S. Pat. No. 5,875,268 to Miyake, teaches image processing with low-resolution to high-resolution conversion.

U.S. Pat. No. 5,991,464 to Hsu, teaches method for adaptive video image resolution enhancement.

U.S. Pat. No. 5,917,963 to Miyake, teaches image processing with high-resolution conversion.

U.S. Pat. No. 6,075,926 to Atkins, teaches computerized method for improving data resolution.

U.S. Pat. No. 6,567,568 to Nabeshima, teaches pixel interpolating device capable of preventing noise generation.

U.S. Pat. No. 6,072,907 to Taylor, teaches method for enhancing and thresholding images.

U.S. Pat. No. 6,285,804 to Crinon, teaches resolution improvement from multiple images of a scene containing motion at fractional pixel values.

U.S. Pat. No. 6,263,120 to Matsuoka, teaches image data interpolation processing method.

U.S. Pat. No. 5,880,767 to Liu, teaches perceptual image resolution enhancement system.

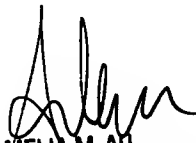
Art Unit: 2623

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Q Le whose telephone number is 703-305-5083. The examiner can normally be reached on 8:30 A.M - 5:30 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to TC Customer Service whose telephone number is 703-306-0377.

BL
October 8, 2003


AMELIA M. AU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600